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Length-Weight Relationship and Condition Factor in Barilius Sacra of River Torsa in West Bengal

Das Satyajit, Das Tanujit, Das Biplab Kumar *and Kar Devashish

Department of Life Science, Assam University, Silchar – 788011, Assam, India

ABSTRACT

The present study attempts to develop a comprehensive Length-Weight relationship and relative condition Factor (K_n) of Barilius sacra collected from River Torsa in West Bengal. The value of exponent 'n' in the equation $W = cL^n$ was found to be 2.47 for the species Barilius sacra. The computed 't' value indicated that the 'n' value of the species is not significantly different from the expected value '3' and hence the Cube Law $W = cL^n$ hold good in the case of Barilius sacra. The computed co-relation co-efficient (r) in Barilius sacra was 0.961 which is very closer to 1 indicating that there is high positive correlation between length and weight in the species. The relative Condition Factor (Kn) remained greater (1.16) than 1 for the species indicating their general well being to be good in Torsa river in West Bengal.

KEYWORDS: Length-weight relationship,Relative condition factor,Barilius sacra,Torsa River, West Bengal.

***Corresponding Author:**

Biplab Kumar Das

Department of Life Science,

Assam University,

Silchar – 788011, Assam, India

E Mail - biplabkumar1987@gmail.com

INTRODUCTION

According to Le Cren, knowledge of the length-weight relationship of a fish is essential, since various important biological aspects, *viz.*, general well being of fish, appearance of first maturity, onset of spawning etc., can be assessed with the help of condition factor, a derivative of this relationship, moreover, the length-weight relationship (LWR) of fish is an important fishery management tool because they allow the estimation of the average weight of the fish of a given length group by establishing a mathematical relationship between the two. As length and weight of fish are among the morphometric characters, they can be used for the purpose of taxonomy and ultimately in fish stock assessment[1]. In fisheries Science, the condition factor is used in order to compare the 'condition', 'fatness' or well being of fish and it is based on the hypothesis that heavier fish of a given length are in better condition. Condition factor has also been used as an index of growth and feeding intensity. An extensive research on length-weight relationship of commercial freshwater fishes from different water bodies in India is already reported Das et. al [2,] Das et al. [6.]. This study reports the LWR of Barilius sacra of Torsa River in West Bengal, India.

MATERIALS AND METHODS

In fishes, generally the growth pattern follows the cube law. Such relationship for the fishes will be vaild when the fish grows isometrically. In such cases, the experimental value must be exactly 3. But, in reality, the actual relationship between length and weight may depart from the ideal value due to environmental conditions or condition of fish. This relationship is expressed by the equation $W= aL^n$. This equation was used by several workers for different fish species form different habitats.

In this study, a total 15 fish specimens comprises of *Barilius sacra* ranged from 53-97 mm in length and 1.82-7.23 gm in weight were studied for the length weight relationship. The species were identified by using the key provided by Jayaram[7]. Individual measurements of fish species pertaining to total length (TL cm) and total weight (g) were done with the help of precision Vernier Calliper and Digital Sartorious Electronic Balance respectively. The total length (TL) of each fish species were taken from the tip of snout to longest ray of caudal fin. Fish weight was measured after blot drying.

The LWR was established by fitting equation of the form

$$\mathbf{W=cL^n} \quad \text{.....(1)}$$

Where W is the weight of the fish, 'L' its length and 'c' and 'n' are constants. The equation 1 could be expressed in the linear form by using logarithms, as given below:

$$\textbf{Log W = Log c + n Log L}$$

The estimates of the constants c and n were obtained empirically by using the formulae, as given below:

$$Log\ C = \frac{\sum Log\ W \times (\sum\ LogL^2) - \sum Log\ L \times \sum(LogL \times LogW)}{N(\sum LogL^2) - (\sum (LogL)^2)}$$

$$n = \frac{\sum Log\ W - NLogC}{\sum og\ L}$$

Significance of the variation in estimates of n from the expected value 3 (cube law). Weights were estimated for different lengths using relationship equation. The relation between length and weight for each fish was computed with help of statistics. The Fulton's Condition Factor (K) was computed by using the formulae, as given below:

$$Condition\ Factor\ (K) - \frac{Weight\ (g)}{(Length)^3\ (cm)} \times 100$$

RESULTS AND DISCUSSION

The formula correlating L-W of Barilius sacra is given bellow:

Log W = -4.069 + 2.47 Log L

It is evident from the result that the 'n' value of length-weight relationship was found 2.47, represents fish that becomes less routed as length increases, indicating the allometric pattern of growth in the fish.

The computed correlation co-efficient (r) value in Barilius sacra was found to be 0.961 which indicates, there is high positive correlation between the length and weight in the species Das et al [6].

The Condition factor (K_n) is an indication of general well being of fishes. The Le Cren's condition factor (K_n) of Barilius sacra was found to be 1.16 which is greater than 1, Thus, indicating their general well being to be good. Therefore all these observations appear to indicate that single value of 'c' and 'n' may not be responsible for the entire size range of the fish.

The observed average weight of the species against the observed length with a predicted data, a parabolic curve has been obtained and a logarithmic graph prepared with the observed data of log L and log W with a predicted data showed a straight line relationship. The exponential value for Barilius sacra is the hypothetical value (3), 'n' value was 2.47 and the correlation co-efficient was 0.961. In length-weight relationship of Barilius sacra, weight increases with length. Thus, it is clear that these fishes maintain its shape throughout its life.

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AUTHOR:

Biplab Kumar Das: Mr Biplab Kumar Das is currently pursuing Ph.D. (Finally Registered) under the Supervision of Professor Devashish Kar in Department of Life Science and Bioinformatics, Assam University, Silchar, Assam, India. He has done his M.Sc. from Assam University, Silchar in the subject Life Science (Zoology). He presented many research papers in National and International Conference/Seminar/Symposia. He has published many research papers in National and International journals. His topic of research is Biodiversity, Remote Sensing and GIS.